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The Complexity of Information for Sustainable Choices

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ABSTRACT
Changing one's lifestyle to become more sustainable requires making informed decisions, which in turn creates a demand for specific information about these choices. As we discovered though a set of semi-structured in-depth interviews, acquiring this information is an unnecessarily complex and cumbersome task, especially in the context of purchasing goods that one considers to be sustainable. In this paper, we elaborate on two main obstacles to retrieving sustainability information that represent challenges for the HCI community and need to be addressed in order to achieve a simple, sustainable life: simplicity of and trust in information.

Author Keywords
Sustainability, HCI, qualitative studies, consumer electronics

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms
Design, Human Factors

INTRODUCTION

More and more people are changing their behavior to live a more sustainable life, which includes (but is not limited to) consuming less energy, considering sustainable actions for everyday activities, and purchasing less environmentally harmful goods. All these things create challenges due to the fact that they require choices to be made. For some of these choices it seems to be simple to determine what the more sustainable choice is, e.g., whether to go to work by car or by bike. But oftentimes it is difficult to make that decision; either because the two options are so similar that a close look is needed to decide what to choose or because the two choices are on different scales and thus lack hints for comparison. For example, consider two technical devices from different manufacturers that have almost the same technical features, but the environmental information one can find about these devices reports on completely different, uncomparable environmental issues such as carbon footprint versus recyclability.

In either case, to make the decision in an informed way we believe that having access to the right information about these products is the key. In a world where information is becoming accessible everywhere, one might draw the naïve assumption that this is easy to achieve; it should be simple to access the information necessary to make sustainable product choices. In some domains, there exist certain standards or established guides to help people make such decisions. For example, some people consider one of their contributions to sustainability to be buying organic food or similar products that are labeled with specific environmental information they connect with the term sustainability. With everyday life being increasingly permeated by ubiquitous technology, and with the increased effort of research and environmental organizations and other contributors, theoretically almost all information exists somewhere.

We conducted interviews to gain insight into the decision-making process and see how environmental information is being used; however, results revealed that environmental information is in many cases not being used effectively to make decisions in purchasing electronics. In the following, we will elaborate on two main challenges for HCI research that need to be addressed to overcome this problem: reducing the complexity and establishing trust.

OVERWHELMING COMPLEXITY OF INFORMATION

In our studies, the focus is on purchasing decisions, and of particular interest is the domain of consumer electronics. We conducted interviews with people who identified themselves as environmentally informed and expressed an interest in making sustainable choices for their purchases in many different product domains. Interestingly, none of the eleven participants reported any particular experience where specific environmental information served as the deciding factor for a product choice in the case of consumer electronics. Many participants asserted that this information is not available during the purchasing process; some participants even reported that they did not find the information despite a thorough search for it: *"Zero! There is absolutely no information about it. I've searched for that before, but there is zero [information about the manufacturing process of electronic devices], as if it's 'unimportant.'"*

When asking for details about their information-gathering process, participants mentioned that they were interested in

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simple visualizations or numbers that allowed for easy comparison. Some even recalled typing in simple questions about a product in a search engine, and going from there to read up on the details. However, all of them complained about the complexity of this task due to the complicated process of pulling the desired information out of the search results. For example, when comparing two or more different products with respect to a specific technical feature, participants still had to look up this information on several websites in order to make an informed choice.

Looking at the results of our studies, we have a basic understanding of the information search process prior to purchases, and we identified common routines for how users approach this search. Why is it that users do not use environmental information in their decision-making process, although they express their interest and desire in this information? One might assume that this information is simply not available; however, there is in fact extensive data available about the environmental impact of products. Many websites and services provide this information on different scales, such as the GoodGuide [1], SourceMap [2], or the Greenpeace Guide to Greener Electronics [3]. Somewhere between people's desire for information and the services provided there seems to be a disconnect. This might be either due to matters of presentation or accessibility, or because it is insufficiently integrated into their decision-making and information-gathering process. We have to close this gap and connect the users to the services that provide this information about sustainability in order to allow for people to live a simple, sustainable life.

Therefore, we argue for the existence of two main obstacles – derived from our research – that need to be overcome in order to allow for simplicity in a sustainable lifestyle: firstly, a reduction of the information complexity in the process of gathering environmental information about a product; secondly, as there might be inconsistencies due to the diversity, it is critical to establish trust in the information provided.

REDUCE COMPLEXITY, STRIVE FOR SIMPLICITY

The complexity of sustainable information can be divided into several dimensions, with one being the definition of sustainability itself. Some people refer to something as being sustainable if it does not harm the environment in any way; protecting the environment is the primary goal in this case. Others focus more on the concept of social sustainability by pointing out the negative impact on other people's life, such as the workers under poor labor conditions, or the inhabitants of areas that are exploited by harnessing its natural resources. And while the issue itself was already mentioned in science many decades ago, in recent years an ever-growing number of people started raising concerns about climate change and see this as the central aspect of sustainability. Even in our small sample of interview participants, we recognized all these different views; therefore, it is difficult to define one common ground for the user group when designing for sustainability-related systems. Providing a one-dimensional rating or a "recommended/not recommended" tag might not be sufficient. As an example, the highest-rated cell phone on GoodGuide, the Nokia C6, has 206 people recommending it, while 136 people vote for avoiding this device; not exactly the clear consensus one might expect for the top-rated product in a category.

Similarly, we identified a huge variety of forms of information people are interested in. One of the most common measurements is to calculate the carbon footprint of a product in order to determine its environmental impact. Another indicator, frequently used in the domain of food, is water consumption in the production process, e.g., the often cited poor performance of coffee compared to tea on this measure [4]. Other possible values are acidification, toxicity, use of scarce resources (of especial interest when looking at consumer electronics), or soil contamination, just to name a few. All these measurements share the same problems: they are difficult to calculate, require much research to be accurate, and – when given without a relative scale – are unable to create a simple picture in one's mind about the concrete environmental impact of a product.

Reducing this complexity to allow for simple choices represents one of the most important challenges for HCI designers. To some extent, successful examples of domains where this information is already available might help to find a solution; e.g., purchasing food or cleaning products, according to our interviews, is one of the easier tasks for environmentally-minded consumers. One participant reported: *"On all product packaging you have these labels nowadays; fish, frozen fish, it's MSC-certified. For foods such as fruits and vegetables, they're 'organic' and 'ecological', then you can realize it quite well"* and *"there is this store brand, a cheap one, for the ecological cleaning products, and they're just labeled 'biodegradable', because they don't contain so many chemicals, which usually aren't necessary, too."* Statements like this suggest that participants felt it was easy for them to make a choice; it does not necessarily imply that the decision was sustainable in the end, but participants had the impression that they could make an informed, sustainable decision and satisfy their desire for a simple, sustainable life. Although these findings are not generalizable for the whole user population and all domains, they provide examples that managed to let participants feel better about the perceived information. The question of whether or not these choices fit the participants' understanding of sustainability notwithstanding, they did not perceive an overwhelming complexity, but rather simple choices.

However, it is not as easy as copying these solutions to other problem domains: while the choice between two products like food is usually made just before the purchase in the grocery store, consumer electronics purchases are oftentimes preceded by extensive information retrieval and product comparison, especially regarding the technical features. Additionally, there were also participants who

expressed doubts about the organic labels on food products. They were not helpful for everyone; to some consumers they may even make a choice more difficult – there seems to be no simple one-size-fits-all solution. We can combine the insights from the different domains, though: while the abstraction of complex information in simple labels helps reduce the complexity of choice, one possible path to explore might be incorporating environmental information at the beginning of the product search or make use of opportunities such as information visualization, crowdsourcing, and social networks. By integrating the data into everyday routines, it does not require additional effort to get to the information.

Given that many products are bought online today, especially in the case of consumer electronics, this could be achieved by integrating the sustainable information into the purchasing process. We believe there is an opportunity to rethink how environmental labeling on products could help to support decision-making. Going beyond static, present-day one-size-fits all labels, we might consider ways in which dynamic labels could provide customized views of environmental information, taking into account user preferences for information format or individual priorities regarding sustainability. We believe that tailoring the content and visualization of such information to meet the needs of individuals will help to reduce frustration and effort to decipher it, thus making for simpler, lower-stress decision-making.

Another, more holistic approach would be to integrate feedback about environmental impact into the actual process of acquiring product information. We already know from our study that people are looking at many websites comparing products and offering reviews, from customer reviews embedded into store sites to online product comparisons provided by expert magazines. Visiting additional websites that focus in particular on sustainability adds an additional burden. It is difficult to compare results across different web sites, and people who might be interested in environmental impact but are not actively searching for it may not get to it at all. If environmental information were accessible along the usual path of users' information-gathering processes and the data was presented alongside technical or other, non-environmental information, this might not only increase its perception and acceptance, it might even reach those who are not explicitly interested in sustainability in the first place. By offering everything in one place, we could reduce complexity by removing the number of information sources people have to take into account in decisions, ultimately simplifying the process of information acquisition.

ESTABLISH TRUST IN INFORMATION

Living sustainably entails making decisions, and as for every decision, the motivation behind it may not always be rational. Sometimes an intangible, indefinable feeling can have a huge impact on decisions. One of these feelings is trust, and as our interviews revealed, it is a particularly important one for all our participants. Without trust in information about a specific product, the information is often disregarded – or can even be turned against itself, resulting in the opposite effect than intended. If information is accurate but flawed in presentation, even with the best of intentions one can take an unintentionally unsustainable action. Therefore, we think trustworthy information is one of the key challenges to make informed decisions, and thus contributes to a simple, sustainable life.

In our interviews, we encountered the fragility of trust multiple times when different participants expressed completely opposing views about the same issue. For example, one participant pointed out his confidence in the grocery stores' label by saying *"COOP has the 'Knospe', which is the highest organic label available in Switzerland, and therefore to me there is quite a trust in these things"*, while another interviewee associated the same products in the same market just with greenwashing: *"[At COOP] you just pay for the label 'organic', and I think that's a little annoying."* This adds to the level of complexity: there is no simple rule to decide whether a product is sustainable or unsustainable. Even if there is substantial, reliable information on a product, backed up by several sources, and provided in an easy-to-understand way, it may still not be sufficient for consumers to make a simple choice if they are unable to trust the information.

It seems to be a vicious cycle: people want more information, this leads to problems of increasing complexity and distrust, and to solve the latter, only further explanation by providing additional information seems to help. To break out of this pattern, the information has to be provided in a way that is understandable and trustworthy. It needs to be simple enough that users can understand it and not feel fooled, yet it needs to be elaborate enough to not withhold important information. This is not just a matter of thoughtful and creative information visualization; it is also critical to understand the users, their needs and their thoughts, and to relate to trustworthy and familiar sources and concepts.

Therefore, one of the possibilities we could imagine to increase the level of trust is to relate to known patterns the user trusted before. Participants mentioned that they trusted in several labels or standards, e.g., by saying *"I trust the organic certification of the EU, but there's nothing more I can do"*. New presentations or visualizations of environmental information that build upon familiar standards and establish a perceived connection to reliable sources might "inherit" this trust. This could be done by offering additional background information and clearly disclosing the sources, increasing transparency and openness of data. As a side effect, it might also be easier for users then to comprehend the data.

Every additional piece of information that is provided not only potentially adds to the level of complexity, it also

needs to be accepted by the target audience. While all our participants expressed a desire for more information, they raised concerns about reliability at the same time, such as: *"I'd love more information, in one way, but I do not know how I can trust that [information]".* Participants reported that before purchasing an electronic device they compared many different devices, searching for information from various sources. Here the problem of complexity can be found for matters other than sustainability, too: the overwhelming amount of technical features creates a variety of choices and demand for more information in order to make an informed decision. In case of participants who identified themselves as not particularly tech-savvy, their solution was oftentimes to seek advice from sources they trust: either by looking for customer reviews or asking friends familiar with the specific product category. They asked their social contacts to put the complex information into words they understood and believed, simplifying the matter for them.

There is no easy solution to this problem, but we believe what we can learn from these results is that social connections help to establish trust while even possibly decreasing complexity. The more connected participants felt to the author of a product review, the more they relied upon this information, weighing it higher in their decision-making process. Such a connection did not need to be personal; in some cases a common background, such as living in the same area or having similar views on other products in the past was sufficient to establish trust. With the growing distribution of social networks, this might even become easier in the future and open up opportunities to overcome both the issues of trust and complexity at once.

DISCUSSION

Taking sustainable action in many cases requires making sustainable decisions. As we have seen in our studies, these decisions often include finding and using relevant environmental information. However, this information is often difficult to access and use even when it exists, thus complicating the decision-making process. We posit two major challenges that HCI research needs to address in order to achieve a simplification of these processes: reducing the complexity of information while establishing and maintaining trust in this information. We argue that doing so will be a step in the direction of a simpler life.

There is a strong connection between these two challenges, and addressing both at the same time will be a particularly difficult undertaking for designers of sustainable HCI systems. Neither challenge is straightforward to address in isolation; taken together they may even pose contradictions. While "reducing complexity" may lead to a simpler representation of the information, this simplicity can give the impression that the data is superficial and inaccurate, leading to mistrust. On the other hand, to establish trust, especially for new and unfamiliar content, a minimum of background information needs to be provided. In addition to examining trust and simplicity as two separate aspects of the simple, sustainable living equation, we also need to consider the relationship between them.

On a broader note, we also need to consider the greater implications of providing environmental decision support for purchase practices as part of a sustainable life. What ends do we achieve by making it easier for people to make decisions with which they are comfortable from a sustainability standpoint? Does making the decision-making process easier ultimately simplify one's life as a whole? One could argue that many of the technologies and products that make tasks "easier" ultimately do not bring "simplicity" to the lives of their users or owners. By looking to technological approaches as a means of simplifying the complexity, obscurity, opacity, or overwhelmingness of information, are we looking down a path of simplicity, or merely one of convenience? Taking a wider perspective on our own work and the field of sustainable HCI in general, understanding the impact of our efforts on the objective of a "simple, sustainable life" will also mean building an understanding of what constitutes simplicity itself.

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